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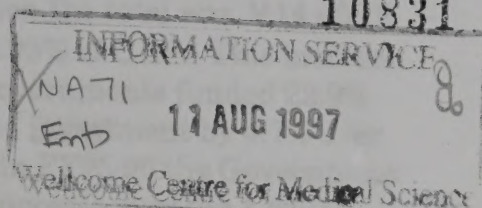


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Science & Technology Section

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Science and State - Japan
Research - Finance

S&T IN JAPAN - 1997

A short note on Japan's S&T budget is attached. It reviews the expansion of S&T programmes following the publication of the S&T Basic Plan. Most areas benefit from increased expenditure in 1997. However, judged in the light of the recent proposals made by the Conference on Fiscal Structural Reform to reduce expenditure, and adopted by the Japanese Government on June 3rd, it is unlikely that the plan to double the S&T budget in five years will be realised.

In keeping with the mood of reform that now prevails in Japan, the Government proposes to reduce its deficit from 7% to 3% of the GDP. For FY98 the target is to reduce general expenditure by 0.5%, (approximately \$2 billion). The bulk of this reduction will be achieved by cuts in the social security, defence, public works and overseas development aid budgets. The promotion of S&T budget is still expected to increase but by less than 5%. This component only comprises 23% of the total S&T budget and it is impossible to say what the implications are for other programmes. With an inflation rate of around 0.5%, this is still a significant increase.

Large projects are expected to come under greater scrutiny in the years ahead and there are already signs that the Science and Technology Agency is reviewing its support for ITER and the Fast Breeder Reactor Programme. There are nevertheless many other opportunities for pruning government S&T programmes without adversely affecting the Basic Plan's objectives.

Although some of Japan's concerns about the future were under-estimated, there was a tendency to be widely pessimistic in the assessment. In particular, there were major pockets of optimism about the future of research and development in the private sector. It was also an occasion for the Agency to highlight the Government's relatively low contribution to S&T compared with its major competitors, France, Germany and the USA.

The Basic Plan advocated increased expenditure across a broad front. It encouraged expansion of research in the universities, the national laboratories, with particular encouragement given to university industry collaboration.

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SCIENCE & TECHNOLOGY IN JAPAN - 1997

The most reliable figures for R&D expenditure in Japan are produced by the Statistics Bureau of Management and Coordination Agency, and the latest authenticated figures available are for FY95/96 when the total was ¥14,408.2 billion, a 6% increase over the previous year and 2.93% of GDP. This increase followed two years of decline. National and local governments funded 22.9% with 77% by the private sector. The latter increased investment by 4.1% over the previous year following three years of decline. In FY95/96 the Government increased its R&D expenditure by 12.8%, a sharp increase over the 1.6% of FY93/94, basic research accounted for 15% of the total expenditure, 24.6% was applied research and 60.5% on long term developments. During the year the number of researchers increased by 2.2% to 673,400 which builds on the 2.8% increase of the previous year. A sign that despite reduced company R&D budgets, levels of research have been maintained throughout the recession.

For the past twenty-five years, Japan's R&D expenditure has increased steadily year by year, in line with the growth in GDP. This was regarded as the natural order. However, in the early 90s, following the bursting of the financial bubble and a recession, R&D budgets declined. This generated considerable concern that Japan would lose its competitive edge in the next century. Faced with the prospect of decline, Japan re-examined its traditional strengths (and weaknesses) and a consensus emerged for R&D that manifested itself in the Government's Basic Law for S&T passed by the Diet in 1995. This Law owed much to university policy makers. It called for a substantial increases in government's R&D expenditure to improve the creativity and quality of basic research.

The Government's response to the new law was the S&T Basic Plan published in 1996. This plan argued that Japan was heading for a crisis due to the hollowing out of industry and problems associated with global climate change together with food and energy shortages. It also claimed that society lacked the vitality to deal with these problems. This assessment was made against a background of the '93 and '94 decline in Government's R&D and three years of declining research in the private sector. It was also an occasion for the Agencies to highlight the Government's relatively low contribution to R&D compared with its major competitors, France, Germany and the USA. The Basic Plan advocated increased expenditure across a broad front. It proposed expansion of research in the universities, the national laboratories, with particular encouragement given to university industry collaboration.

Although some of Japan's concerns about the future were understandable, there was a tendency to be unduly pessimistic in the assessments. In practice, there were many positive aspects of the changes. Companies had restructured and curtailed the less promising research and reduced costs by amalgamating

administrative sections during the recession. A point rarely mentioned is that while the R&D budgets declined, the actual numbers involved in research increased. Also, the Government's share of the R&D increased from 18% to 21% in four years, and with the new programmes the percentage will increase further.

The 1997 S&T budgets for the Agencies are the first since the publication of the S&T Basic Plan. All the Agencies have responded with programmes that will result in a substantial expansion of basic research. In particular, research that underpins the development of new industries. Fundamental research across the broad range of endeavor is encouraged. If the plan is adhered to the R&D budget will be doubled in five years with a total expenditure of ¥17 trillion. At ¥3,002.5 billion the Government's S&T budget is 6.8% larger than last year's.

The Basic S&T Plan will result in an expansion of research in the universities and national institutions. The goal, to double the research budget in five years is similar to that of the National Science Foundation in the 80s, and it has a similar aim, to foster research which underpins new products. Concurrent with this increased expenditure, will be organisational changes to promote mobility of researchers and competition with more emphasis on peer review. Once these changes are implemented, a more western style research environment will be in prospect.

In 1997, STA's basic research expenditure will increase by 32.9% with priority given to patentable creative research that will be the basis of new 21st Century products. Key programmes set for expansion include CREST (The Core Research for Evolutional Science and Technology) and SCF (Special Coordination Funds for promotion of S&T).

The number of short-term grants for post-docs will be increased and extra money allocated for regional industries, university equipment and evaluation systems. Research on earthquakes, the elderly, the human genome and cancer will enjoy large funding increases. ¥7,407 million has been set aside for a new Brain Research Institute to focus on (1) structure, function and understanding, (2) neurological disorders, (3) information processing.

Further attention will be given to modeling global environmental change using supercomputers and data derived from advanced satellite and ocean sensors.

Fundamental research will be undertaken on ultrafine structures to double the strength and life of structural steels used for bridges, vehicles and ships. Improved joining techniques and surface treatments will be evaluated. Studies on supersonic aircraft technologies will be expanded and an advanced engine test facility constructed.

STA's nuclear programme has suffered a 1% reduction, the first decline for eight years, and the space budget only increases by 1.5%. The latter, nevertheless includes an extra \$230m for the development of the HOPE X space plane and the H-11A rocket launch system. A new feature in this year's budget is a joint initiative by the STA, Monbusho and AIST to allocate ¥56.9 billion (+77.5%) for strategic research underpinning future industries on the basis of competitive tenders from universities and national research institutions. ¥123 million has been allocated for an independent research evaluation system for the NRI's.

At AIST the Basic Plan has provided further impetus for projects fostering technologies for future industries. Support for renewable energy and conservation projects continue. Under the 'New Sunshine Programme', there are new programmes on photovoltaics, fuel cells, hydrogen fuels, super critical liquids and gas hydrates. Although some of the funding will be allocated on the basis of competitive proposals from industry and the universities most of the work will be in the NRI's. Some projects will be jointly funded by several Agencies. Under the Industrial Science And Technology Frontier Programme (ISTF), projects on biological resources, advanced photon processing and super metal technology will be launched and feasibility studies on conjugate materials, data processing, neuro-biotechnology, intelligent social structures, and eco-smart engines begun. NEDO will be spreading its activities across an ever widening spectrum with interdisciplinary research on superconductivity, new materials, biotechnology, electronics, communications, machinery, aerospace and natural resources.

Monbusho's share of the budget has increased by 3.8% and now represents 42.9% of the total S&T expenditure. MITI's budget has grown by 12.1% and now comprises 15.7% and STA's has grown by 6% to become 24.5% of the total. Within the Monbusho budget, the General Account for grant in aid, JSPS and public and private universities has increased 8.7%. The Special Account for scientific facilities, research institutes and national universities has increased by 2.3%.

Monbusho's FY97 budget, follows the directions set in the S&T Basic Plan. With resources allocated for a new evaluation system, expanded university-industry cooperation, enlarged international programmes and an improved research environment for post-docs. Restrictions governing academic links with companies will be relaxed, and steps taken to promote a creative and mobile post-doc workforce. The "Research for the Future" programme will benefit from a ¥9B increase to ¥20B. This research introduced last year is regarded as "investment", and funded by the issue of government bonds. There is no budget ceiling for research funded by this route. Following Monbusho's ¥3.85B contribution to CERN in FY96, a major reorganisation of Japan's high energy physics centres is planned in '97. The National

Laboratory for High Energy Physics (KEK), the Institute of Nuclear Study (University of Tokyo) and the Meson Science Laboratory in the University of Tokyo will be combined under the High Energy Accelerator Research Organisation. This will facilitate the realisation of the large hadron project and foster interdisciplinary research. Monbusho will continue to fund the Tristan B-Factor at KEK, the large scale helical fusion apparatus, ISAS' lunar-A penetrator project, the optical infra-red telescope, as well as maintaining the Showa Antarctic research station. The number of collaborative programmes within industry will increase slightly but the projects remain modest at around ¥5m each.

Even at this early stage in the implementation of the Basic Plan, there is concern amongst government officials that there will be a public criticism if after spending ¥17 trillion on R&D the economy is not thriving, and the shops not full of new high-tech goods available. Responding to political pressure for more evaluation, the Prime Minister's Council for Science and Technology is setting new standards for peer review.

In the past, Japan's industrial success has been attributed to MITI's catalytic role in fostering company partnerships and technology development. Doubt has been expressed on the effectiveness of these programmes and their contribution to the commercial successes of companies. Notwithstanding the occasional criticisms from the USA, the AIST and STA continue to support projects covering a broad spectrum of cutting edge technology. Because of the comprehensive range of topics included, some of these can be expected to be successful.

Following the recession in Japan, company research has become more focused on the near term, but there is still considerable overlap of research amongst the major companies. Nevertheless, Japanese companies are well positioned to exploit the new technologies in products which include flat screens, DVDs, satellite navigation systems, communications systems, PHS, PCs and electronic recreation software.

When the exchange rate was ¥80 to the Dollar, Japanese companies restructured and automated production. Now with the Yen depreciating 50%, profitability is returning to the manufacturing sector. Japan enjoyed around 3.5% growth in GDP in FY96, and growth based on high technology exports will be a feature of the next few years. Japan's fear that it would be displaced in world markets by the Asian Tigers is still some way off.

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